



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,690	10/17/2003	Walid A. Atia	1118.us	2389

25263 7590 11/25/2005

J GRANT HOUSTON  
AXSUN TECHNOLOGIES INC  
1 FORTUNE DRIVE  
BILLERICA, MA 01821

EXAMINER

DETSCHEL, MARISSA

ART UNIT PAPER NUMBER

2877

DATE MAILED: 11/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/688,690

Applicant(s)

ATIA ET AL.

Examiner

Marissa J. Detschel

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on November 14, 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 25-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 9-19, and 32 is/are rejected.
- 7) ☒ Claim(s) 7, 8, 20-24 and 33-35 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 4/12/04 5/18/05
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election without traverse of Group 1, claims 1-14 directed to a spectroscopy system in the reply filed on November 14, 2005 is acknowledged.

This election is accepted by the examiner, and is therefore final.

### ***Information Disclosure Statement***

The information disclosure statements filed on April 12, 2004, and May 18, 2005, have been fully considered by the examiner.

### ***Drawings***

The drawings are objected to because two reference number **122's** and two reference number **146's** are presented in figure 2.

The reference number **126** in Figure 10 should be **106** to correspond with applicant's disclosure.

Two reference number **200's** are presented in figure 12B.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "152" and "158" have both been used to designate a powertap.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The disclosure is objected to because of the following informalities:

The phrase "a targe" in line 12 of page 8 of Applicant's specification should be "a target."

The phrase "tunable optical filter system 10" should be "tunable optical filter system 20" on page 19, line 7.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 5, 11, 15-17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Zavracky (USPN 6,381,022).

In regards to claim 1, Zavracky discloses a microspectrometer (10) comprising a source system for generating light to illuminate a sample (column 3, lines 10-13);

a tunable Fabry-Perot filter system (14, 13, and 18) for filtering the light generated by the source (column 4, lines 30-32);

a detector system (12) for detecting the light filtered by the tunable Fabry-Perot filter from the sample (column 2, lines 30-33),

wherein at least two of the source system, tunable Fabry-Perot filter system, and the detector system are integrated together (column 2, lines 30-33).

A preferred embodiment of Zavracky's device is as a micro-gas sensor. This involves illuminating a gas sample with light and sending the resulting photons from the illumination into the microspectrometer device, including the tunable Fabry-Perot filter system (column 16, line 64 to column 17, line 6).

Regarding claims 2, 4, 16, and 17, the source system used in Zavracky's microspectrometer could include a broadband source such as a light emitting diode (column 15, lines 27-30). A superluminescent light emitting diode is a specific type of light emitting diode.

In regards to claim 5, the tunable Fabry-Perot filter system of Zavracky's device comprises multiple, parallel filters (column 4, lines 37-38).

Regarding claims 11 and 19, the detector system and the Fabry-Perot system of Zavracky's device can be integrated on a common bench (i.e. substrate) (column 2, lines 30-33).

In regards to claim 15, the source system of Zavracky's spectrometer comprises a broadband source for generating broadband light (column 15, lines 27-30); and the tunable Fabry-Perot filter spectrally filters the broadband light from the broadband source to generate a tunable signal to irradiate a sample (column 15, lines 39-40). Since the broadband light signals are produced within the microspectrometer, they are sent through the tunable Fabry-Perot filter before entering the sample.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5, 6, 9, 10-12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korn et al. (USPN 6,407,376).

Regarding claim 1, Korn discloses an optical monitoring system that monitors an optical signal of spectrally separated channels (i.e. a spectroscopy system) comprising

A tunable Fabry-Perot filter system for filtering the light (14) generated by the source (150, 140, 154) (column 5, lines 63-66);

And a detector system for detecting the light (16) filtered by the tunable Fabry-Perot filter (124),

Wherein at least two of the source system, the tunable Fabry-Perot filter system, and the detector system are integrated together (Figure 5).

Korn does not disclose the use of a source system to generate light to illuminate a sample to be tested. Korn does disclose the use of multiple separately modulated laser diodes tuned at different wavelengths at the transmitter of the device (column 1, lines 12-15). It is inherent to send light from a light source through a sample to create these wavelengths for spectroscopic measurement. Therefore, it would be inherent for a light source and a sample tested to be provided with Korn's device to create the wavelengths of light for measurement. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to illuminate a sample with light to tune the wavelengths of the light to be sent through the device of Korn.

In regards to claim 5, the tunable Fabry-Perot filter system of Korn's device comprises multiple parallel filters (140, 154).

Regarding claim 6, the tunable Fabry-Perot filter system of Korn's device comprises multiple filters (140, 154) for filtering different wavelength ranges (column 4, lines 58-61)

In regards to claim 9, the detector system comprises multiple detectors (158, 160) responsive to different wavelength ranges.

Regarding claims 10-12, the source system, Fabry-Perot filter system, and detector system are all integrated on a common bench, in a common package (Figure 5).

Regarding claim 14, an isolator can be provided between the source system and the tunable Fabry-Perot system for preventing backreflections into the source system (column 2, lines 23-25).

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korn et al. (USPN 6,407,376) in view of Wang (USPN 5,475,221).

Korn does not disclose the use of a broadband source, a system of multiple, multiplexed diode chips, or a superluminescent light emitting diode as the source system of the spectroscopy system. Wang discloses the use of a light emitting diode array in an optical spectrometer that utilizes sending light from the array through an acousto-optic tunable filter (AOTF) to test a sample. The AOTF acts like a monochromator to provide broadband spectral tuning and selection (column 2, lines 4-5). A tunable Fabry-Perot filter also provides broadband spectral tuning in an optical spectrometer, and is thus a functional equivalent of the AOTF. Fabry-Perot filters are more accurate measurement devices than AOTFs. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the light emitting diode array of Wang's device in Korn's device to provide broadband light to be spectrally tuned with the Fabry-Perot filter in order to enable more accurate results because the Fabry-Perot filter is a more accurate measurement device.

Regarding claim 2, Wang discloses using an array of light emitting diodes to simulate the optical emissions of a broadband light source. Therefore, this array simulates a broadband light source. (column 1, lines 52-57)



In regard to claim 3, the light emitting diodes of Wang's device can be in a frequency domain multiplexed mode (column 2, lines 5-9).

Regarding claim 4, Wang does not disclose the use of a superluminescent light emitting diode source, but rather discloses the use of a light emitting diode. A superluminescent light emitting diode source is a specific type of light emitting diode that has a higher signal to noise ratio. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a superluminescent light emitting diode in Wang's device to create a more accurate measurement.

Claims 13 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korn (USPN 6, 407,376) in view of Krawczyk et al. (Krawczyk, S. K. et al. "GaN and Related Compounds for MEMS and MOEMS," Aromagraph DC 2000 System, vol. 51, no. 8, pp. 623-625).

Korn does not disclose the use of a MEMS tunable filter in a spectroscopy system. Krawczyk discloses the use of an electronically controlled (tunable) air gap Fabry Perot optical filter in an MEMS or MOEMS for spectroscopic detection of molecules in the UV domain of wavelengths (page 622, left hand column line 14 to right hand column line 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the filter in the tunable MEMS device as the tunable filter in Korn's device in order to take spectroscopic measurements of a sample.

Regarding claim 32, the tunable movable mirror die of Krawczyk's device comprises a MEMS tunable movable mirror die and a fixed mirror substrate which is

bonded to the mirror die (Figure 3). The tunable filter of Korn's device is edge bonded to an optical bench (Figure 5).

Claims 15-19 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Wang (USPN 5,475,221)

As to claims 15 and 19, Wang discloses a source system comprising a broadband source for generating broadband light (column 1, lines 52-57); and the tunable filter (AOTF) spectrally filters the broadband light from the source to generate a tunable signal to irradiate a sample (column 2, lines 4-5 and Figure 1).

Wang discloses the claimed invention except for integration of the systems. It would have been obvious to one having ordinary skill in the art at the time the invention was made to integrate at least two of the source system, tunable filter system, and detector system since it has been held that making an old device portable or movable without producing any new and unexpected result involves only routine skill in the art. In re Lindberg, 93 USPQ 23 (CCPA 1952).

Regarding claim 16 and 18, Wang discloses using an array of light emitting diodes to simulate the optical emissions of a broadband light source. Therefore, this array simulates a broadband light source. (column 1, lines 52-57)

Regarding claim 17, Wang does not disclose the use of a superluminescent light emitting diode source, but rather discloses the use of a light emitting diode. A superluminescent light emitting diode source is a specific type of light emitting diode that has a higher signal to noise ratio. It would have been obvious to one of ordinary

skill in the art at the time of the invention to use a superluminescent light emitting diode in Wang's device to create a more accurate measurement.

***Allowable Subject Matter***

Claims 7, 8, 20-24, and 33-35 are objected to as being dependent on a rejected base claim, but would be allowable if written in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of examiner's reasons for indication allowable subject matter.

As to claims 7 and 8, the prior art of record, taken alone or in combination, fails to disclose or render obvious the use of multiple serial filters in a tunable Fabry-Perot filter system.

As to claims 20-23, the prior art of record, taken alone or in combination, fails to disclose or render obvious the use of a tap in a spectroscopy system that diverts a portion of the signal from the tunable filter to a detector.

As to claim 24, the prior art of record, taken alone or in combination, fails to disclose or render obvious a spectroscopy system that comprises a controller for modulating the broadband source and a lock-in amplifier responsive to the controller for locking on to a modulation of the signal.

As to claims 33 and 34, the prior art of record, taken alone or in combination, fails to disclose or render obvious the use of a MEMS Fabry Perot filter in a spectroscopy system wherein the fixed substrate extends below a bottom of the MEMs mirror die for

attachment to the optical bench, with the MEMS mirror die being separated from the optical bench and supported by the fixed mirror substrate.

As to claim 35, the prior art of record, taken alone or in combination, fails to disclose or render obvious the use of a semiconductor source system is a tunable Fabry Perot spectrometer system that includes a hermetic package and a temperature controller for stabilizing the temperature of the source system and the tunable filter system.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marissa J. Detschel whose telephone number is 571-272-2716. The examiner can normally be reached on M-F 8:30am-5:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/688,690  
Art Unit: 2877

Page 12

Marissa Detschel  
11-22-05  
MJD



**HWA (ANDREW) LEE**  
**PRIMARY EXAMINER**